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Revisiting the FencePlot for the Maxwell Construction of a van der Waals Fluid

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An earlier published plot intended to better explain the Maxwell construction of the vapor pressure construct for van der Waals fluids is improved using Inkscape.

I. FIRST-LEVEL HEADING

From a pedagogical point of view, my earlier drawing (`http://digitalcommons.uconn.edu/chem_educ/89` [1]) which was a "fenceplot" showing the Maxwell construction for the van der Waals fluid at several isotherms, is useless.

Realizing this, and learning inkscape suggested that I should re-interpret the original drawing so that it clearly taught what was intended.

The original plot was drawn to scale with tie-line ends accurately represented as the (volume) roots of the van der Waals equation at the temperature and pressure which conformed with the Maxwell equal area rule.

It can be argued that a distorted version of this drawing with enlarged areas (positive and negative) would be preferable. Since the original intention of this set of papers was to emphasize that the roots of the van der Waals equation (a cubic) allowed analytical construction à la Maxwell, it seemed to me more intrinsically honest to keep the scale proper throughout.

The original paper in this series `http://digitalcommons.uconn.edu/chem_educ/88` [2] shows that the entire treatment of the van der Waals equation in current physical chemistry texts can be expanded to include rigorous derivation of the vapor pressure of van der Waals fluids. This means that the explanation of vapor pressure can be emphasized with an analytical example, where otherwise, we are stuck with only words.

[1] David, Carl W., Plotting the van der Waals Fluid in pseudo-3D and the Maxwell Construction (2015). Chemistry Education Materials. Paper 89.

[2] David, Carl W., The van der Waals Equation as a cubic (2015). Chemistry Education Materials. Paper 88.

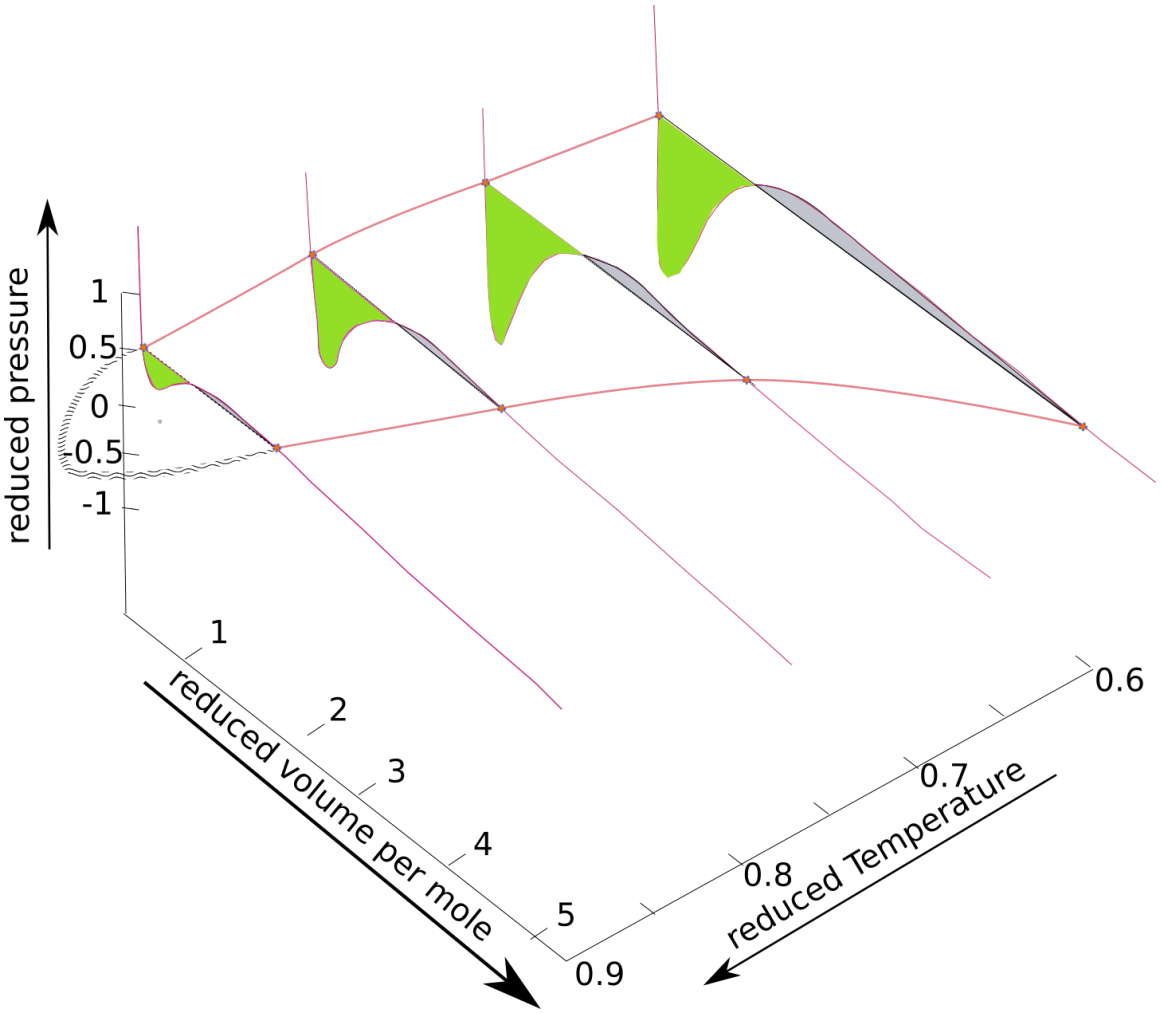

FIG. 1. Note the temperature axis points out at the reader. Also, note that the critical point is not explicitly shown, but is obvious on the coexistence curve